A History of Nickel Hydrogen Batteries

David F. Pickett, Consultant
Jet Propulsion Laboratory
4800 Oak Grove
Pasadena, CA 91109-8099

The nickel-hydrogen battery has been proposed as the leading candidate for rechargeable aerospace batteries since the early 1970s. In addition, terrestrial applications have been considered, but have not been in major production due cost considerations. The development of the technology has evolved to the point where nickel-hydrogen batteries are used on almost every commercial geosynchronous equitorial satellite during the past decade as the power source during shadow periods. It is also used sometimes to supplement the power for satellite electric propulsion systems. The technology is also used in U. S. Government applications, especially in NASA missions such as the Hubble Space Telescope and International Space Station.

Cell and battery designs have evolved from individual pressure vessel cell designs ranging from 20 ampere-hours up to 350 ampere hours and common pressure vessels containing two or more cells up to over 100 ampere-hours. Battery power ranges from about one kilowatt in the early 1970s on experimental flights to over 20 kilowatts on commercial communications satellites.

Attempts to replace the technology with the new lithium-ion technology are underway, but it appears that the nickel hydrogen technology with be in evidence in space for the next couple of decades or so.